



DMSO

Common Syntax and Semantics Update

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Presented by
Jack Sheehan, DMSO Data Engineer
University of Texas Applied Research Laboratories
Email: jsheehan@msis.dmsomil
Phone: 703-998-0660 x448



Common Syntax and Semantics Satus

Data Interchange Formats

- **CMMS: Entities, Actions, Tasks, and Interactions DIF**
- **DE: Authoritative Data Source DIF**
- **DE: Authorized Data Consumer DIF**
- **DE: Order of Battle DIF**

Vocabulary

- **“Verb” Fill via NASM/WarSim Knowledge Capture**
- **“Noun”/“Verb” Dictionary Tools**
- **Entity/Entity Decomposition**

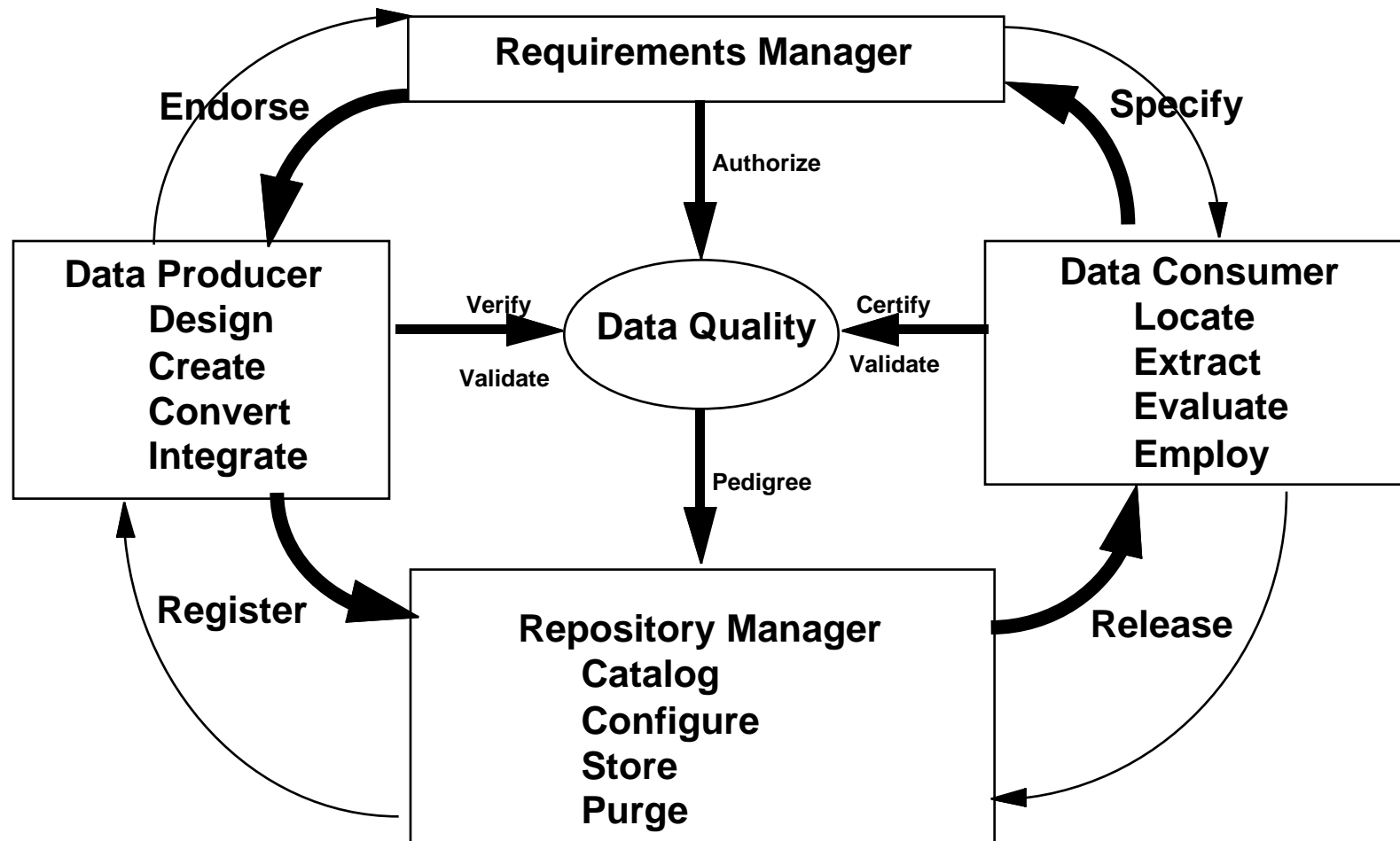
Sentence

- **Capability**
- **Allocation**
- **Action/Action Decomposition**
- **Control**



Data Engineering Process, Version 0.1.3 (Operational Architecture)

DMSO





Supporting Data Products (Technical Architecture)

Data Interchange Formats (DIF)

- **Content (Common Semantics)**
- **Structure (Common Syntax)**
- **Interfaces (Tools/Utilities)**

Authoritative Data Sources (ADS)

- **Producer Identification**
- **ADS Data Interchange Format**

Data Quality (DQ)

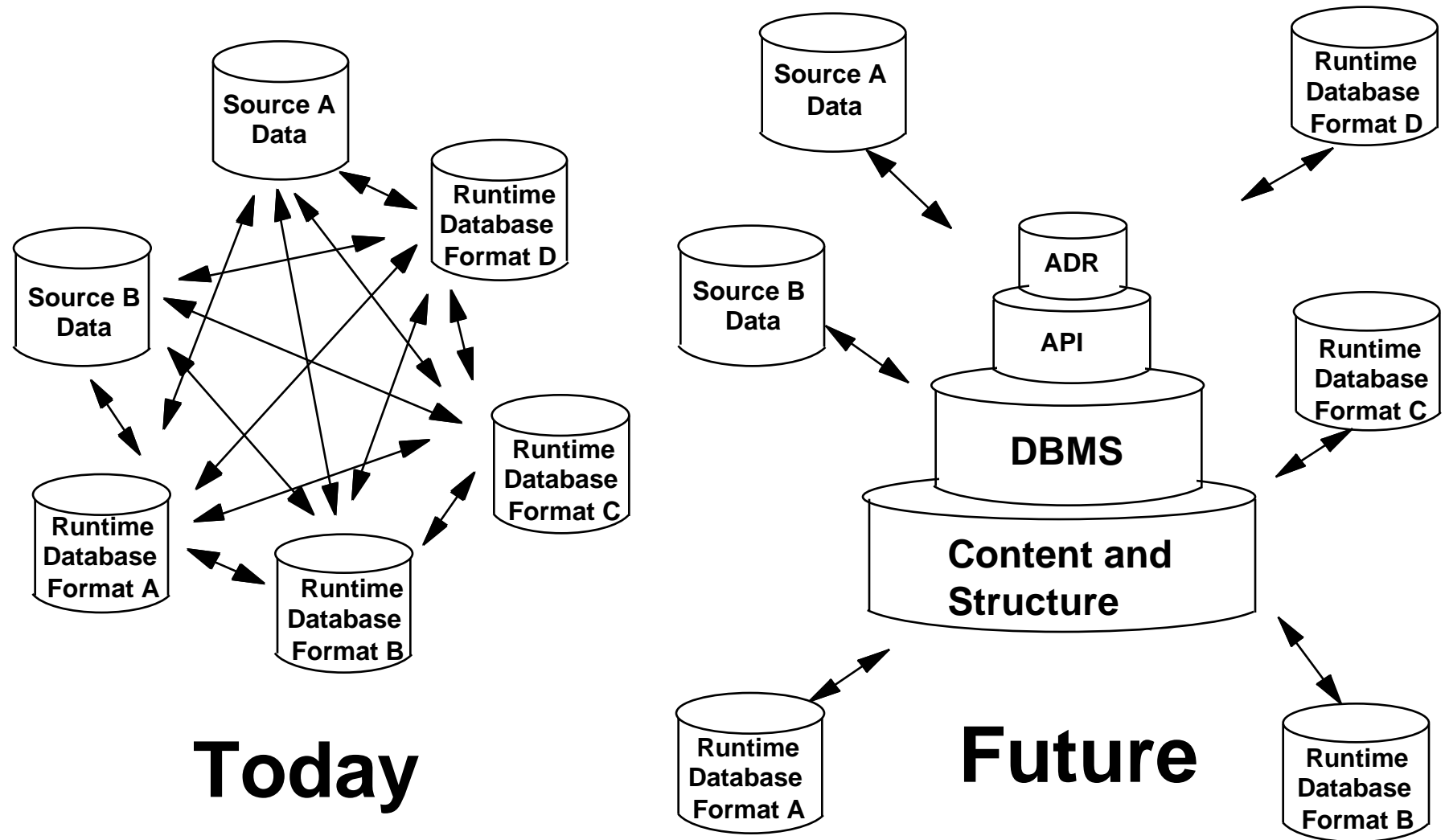
- **Availability, Accuracy, Timeliness, Integrity**
- **VV&A/C Procedures**
- **Tools/Utilities**

Data Security (DS)

- **Consumer Identification**
- **ADC Data Interchange Format**
- **Data Protection**
- **Data Release**



Data Interchange Format





Common Syntax and Semantics

Semantic Components:

- ***Vocabulary***
- ***Sentence***
- ***Context***
- ***Relationship***
- ***Canonical Components***

Structural Maturity:

- ***Internal Knowledge***
- ***Persistent Natural Language***
- ***Fully Structured Views***
- ***Canonical Representations***



Entity Example (1 of 2)

Entity Name: Airbase

Entity Decomposition: Airbase

Operations Facility and Structures

Runways

Taxi-surfaces

Command and Control Center

Maintenance Facilities and Structures

Maintenance Control Center

Aircraft Shelters

Short-term maintenance equipment

Short-term maintenance crew

Rearming equipment

Rearming crew

Aircraft Hangers

Long-term maintenance equipment

Long-term maintenance crew

Spare parts storage facility

Refueling Pit

Refueling stations

Refueling crew

Fuel



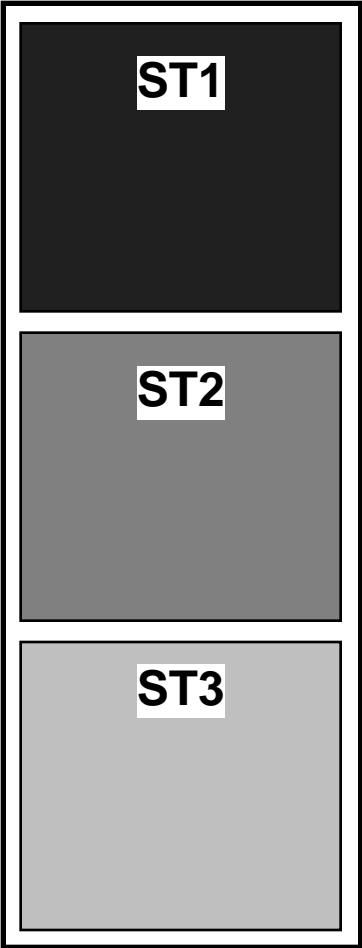
Entity Example (2 of 2)

<u>Entity Capability:</u>	<u>Entity</u>	<u>Capability (Action-Entity)</u>
	Short-term maintenance crew	Assess aircraft damage Repair aircraft Pre-flight check aircraft Declare aircraft mission ready
	Refueling crew	Refuel aircraft
	Maintenance Control Center	Release aircraft
<u>Action Allocation</u>	<u>Allocate (Action-Entity)</u>	<u>Entity</u>
	Refuel Aircraft	Airbase Airborne Tanker Aircraft Carrier

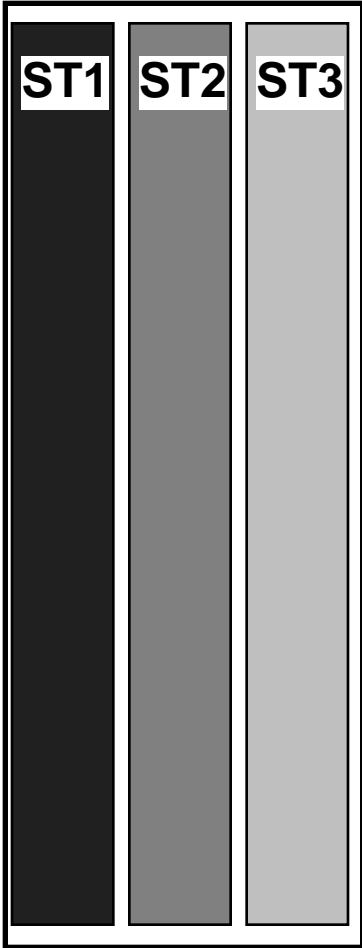


Flexible Sub-Task Structure for EATl

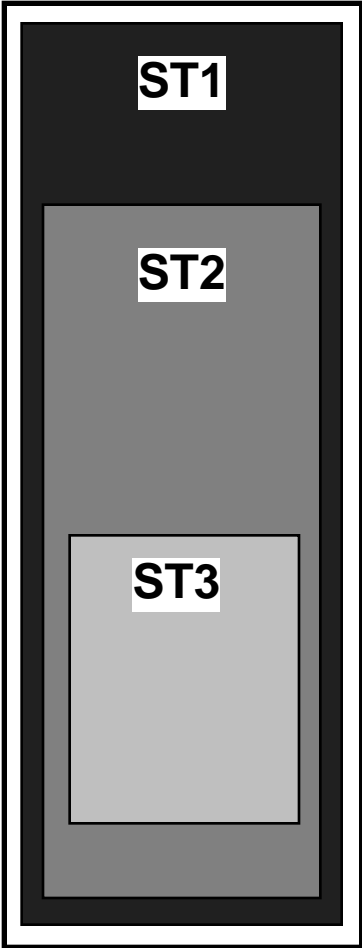
Sequential



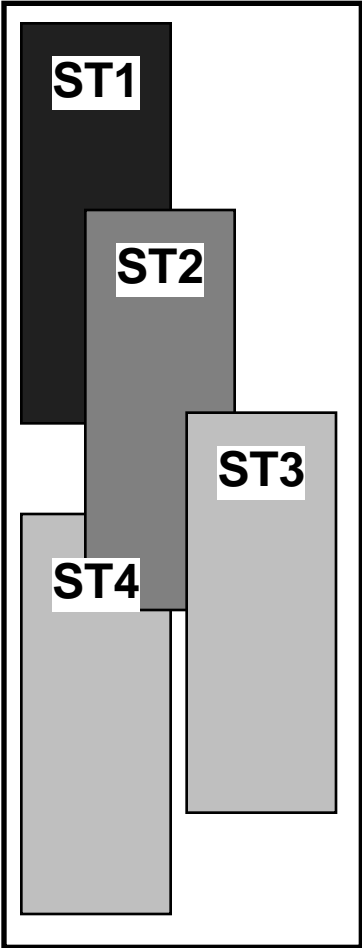
Parallel



Nested



Interleaved





Reserve Word Definitions

Model

A physical, mathematical, or otherwise logical representation of a system, entity, phenomenon, or process.

Mission

A *Task* which is executed by an *Actor* to achieve a specific *Objective*. A *Mission* includes the specific entrance criteria and exit criteria which govern its initiation and termination as well as the specific measures of performance and effectiveness which indicate its relative success.

Mission Space

A set of *Missions* which share a common organizing principle, purpose, or feature.



Authoritative Data Source

Data Source is composed of:

- *Sponsor*
- *Producer*
- *Production Pedigree*
- *Data Item or Model*

Authoritative Data Sources is composed of:

- *Sponsor*
- *Examiner*
- *Data Source*
- *VV&A/C Pedigree*



Data Source

Sponsor:

The combination of a *Person*, *Organization*, and *Role* which constitute the *Actor* which has been assigned the command responsibility for specific content, structure, or process which are required to create, manage, or release a *Data* item or *Model*.

Producer:

The combination of a *Person*, *Organization*, and *Role* which constitute the *Actor* who, because of either mission or subject matter expertise, actually creates, manufactures, or constructs specific content, structure, or process for incorporation in a *Data* item or *Model*.

Production Pedigree:

The comprehensive audit trail which describes the specific methods and procedures actually employed by the *Producer* to create, derive, and construct a particular *Data* item or *Model* for specified end-use. This pedigree provides *Data Source* traceability for constituent *Data* items and *Models* which were incorporated into or employed to produce the particular *Data* item or *Model* in question.

Data Source (DS)

The combination of *Sponsor*, *Producer*, *Data*, and *Production Pedigree* which provide a *Data* item or *Model*. The *Producer* creates the actual *Data* item or *Model* instance by direction of the *Sponsor* and records these activities in the *Production Pedigree*.



Authorized Data Consumer

Data Consumer is composed of:

- *Sponsor*
- *Consumer*
- *Clearance*
- *Security Pedigree*

Authorized Data Consumer is Composed of:

- *Authoritative Data Source*
- *Data Consumer*
- *Access*
- *Release Pedigree*



Entities, Actions, Tasks, Interactions: Basic Elements

<i>Entity</i>	A distinguishable person, place, thing, or concept about which information is kept [2]. In particular, <i>Entity</i> includes the notions of person, organization, facility, feature, materiel, and plan defined in [5].
<i>State</i>	An <i>Entity</i> attribute representing either an internal condition or an external environment.
<i>Event</i>	The location in space and time where a change in <i>State</i> or condition occurs.
<i>Action</i>	The alteration or transformation by natural force or human agency which produces an <i>Event</i>, .e.g... move, sense, communicate, engage, or replenish.



Entities, Actions, Tasks, Interactions: Derived Elements

<i>Role</i>	The function provided by, the part played by, or the character assigned to an <i>Entity</i> .
<i>Actor</i>	The <i>Entity Role</i> -type which takes, executes, conducts, or controls a particular Action.
<i>Supplier</i>	The <i>Entity Role</i> -type which sends, constructs, or produces the input of a particular Action.
<i>Receiver</i>	The <i>Entity Role</i> -type which receives or consumes the output of a particular Action.
<i>Direct-Object</i>	The <i>Entity Role</i> -type which is generated, transformed, or destroyed a particular Action.
<i>Capability</i>	The combination of an <i>Action</i> and a <i>Direct-Object</i> which is recognized as a standard functionality, for example: generate plan, cross river, or shoot missile.



Entities, Actions, Tasks, Interactions: Smallest Unit of Unambiguous Behavior

Entrance Criteria

The set of *States* and the sequence of *Events* which are necessary and sufficient to initiate, begin, restart, or continue *Action* by an *Actor*.

Exit Criteria

The set of *States* and the sequence of *Events* which are necessary and sufficient to terminate, interrupt, end, or conclude *Action* by an *Actor*.

Task

The execution of one or more *Actions* or *Capabilities* by an *Actor*. The *Actor* initiates execution when specific *Entrance Criteria*. During execution the *Action* or *Capability* may receive or consume one or more inputs from *Suppliers*, may produce or deliver to one or more outputs to *Receivers*, and may change one or more *Actor States*. *Task* execution continues until specific *Exit Criteria* are satisfied.

Interaction

The interface which defines the flow of *Events*, *State*, *Entities*, or *Tasks* between two *Entities* or *Tasks*.